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ENVIRONMENTAL INFLUENCES ON AGE AT FIRST LAMBING AND LAMBING INTERVAL IN YANKASA SHEEP

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ABSTRACT

The effects of different environmental factors on age at first lambing and lambing interval of Yankasa sheep kept at the National Animal Production Research Institute, Shika, were studied. Least-squares means (± SE) for age at first lambing and lambing interval were respectively, 597.2 ±12.6 days and 253.1± 2.9 days. Type of birth ($P<0.05$) and season of birth ($P<0.05$) were important in influencing age at first lambing while parity ($P<0.05$), season of previous lambing ($P<0.01$) and year ($P<0.001$) influenced lambing interval. Dams born single or in the dry season attained reproductive status earlier than twin-born dams and those born in the other seasons. Lambing intervals were generally longer than expected from a flock where dams were bred to lamb twice in a year. Measures to reduce age at first lambing and lambing intervals to improve productivity are recommended.

Key words: Environment, lambing interval, Yankasa sheep.

INTRODUCTION

Age at first parturition is an important parameter in livestock productivity and has been shown to significantly influence lifetime reproductive performance in sheep (Schoeman *et al.*, 1991). The mean age at first parturition for African small ruminants is generally long, with the Nguni sheep and Landim goats of Mozambique taking as long as 772 days and 738 days, respectively to come into reproduction (McKinnon and Rocha, 1985). Mavrogenis and Chimonides (1992) in temperate Cyprus, using an accelerated breeding system, showed that Chios ewes first lambed at one year of age. Mukasa-Mugerwa *et al.* (1991) working with Menze ewes observed that supplemental feeding increased post-weaning gains and reduced the age at first lambing by 2-5 months. Sow *et al.* (1985) observed an earlier onset of reproductive activity by ewes born in the post-rains period while Schoeman *et al.* (1991) regarded the spring season as the most favourable.

Prolonged parturition intervals have generally been shown to decrease overall productivity in African small ruminants (Wilson *et al.*, 1985). The all year cycle breeding activity of tropical sheep has been used to foster productivity in Yankasa sheep through a twice yearly lambing programme (Osinowo *et al.*, 1994).

The usefulness of studies on reproductive performance lies in their ability to help identify causes of poor productivity, and hence opportunity for improvement. The aim of this work was to assess the influence of the environment on age at first lambing and lambing interval in Yankasa sheep.

MATERIALS AND METHODS

The data, edited for the study, were obtained from 518 lambing records over a period of 6 years (1985 - 1990) on Yankasa sheep kept at the National Animal Production Research Institute (NAPRI) in Shika, Nigeria. Shika is

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situated within the Northern Guinea Savanna vegetation zone between latitude 11°12' N and longitude 7°33' E. The mean annual rainfall is about 1107 mm with 69.6 % falling in the late wet season (July - September). Mean annual temperature is 24.4°C, with a minimum of about 4°C in the harmattan period (January - March) and a maximum of 37°C in the late wet season (July - September).

The Yankasa sheep has been described by Adu and Ngere (1979). Management of animals was semi-intensive. Ewes and rams were maintained in separate flocks, and ewes were routinely mated to lamb twice a year. Selection of breeding males and females was based on growth rate and litter size. Less productive dams were culled at the end of each breeding season based on a fertility index which considers the dam's present and past records in relation to those of its contemporaries.

Data on age at first lambing and lambing interval were extracted from individual breeding records and analysed for non-genetic effects using the General Linear Model (GLM) procedure of SAS software package (SAS, 1990). Fixed effects of the environment (parity of dam, type of birth, season of lambing, season of previous lambing and year) were included in the models as appropriate for each trait. Means with significant differences were separated by the Duncan's New Multiple Range test (Duncan, 1955). The following models were fitted for age at first lambing and lambing interval, respectively:

$$A_{jkmn} = \mu + T_j + S_k + Y_m + e_{jkmn}$$

$$L_{ijklmn} = \mu + P_i + T_j + S_k + SP_l + Y_m + e_{ijklmn}$$

where

L_{ijklm} = an observation on the n^{th} dam that lambed in the m^{th} year, l^{th} previous season, k^{th} season, with lamb of the j^{th} type of birth and dam of the i^{th} parity

A_{jkmn} = an observation on the n^{th} dam that was born in the m^{th} year, k^{th} season and of the j^{th} type of birth,

μ = overall least-squares mean

P_i = fixed effect of the i^{th} parity

T_j = fixed effect of the j^{th} type of birth

S_k = fixed effect of the k^{th} season of birth

SP_l = fixed effect of the l^{th} season of previous lambing

Y_m = fixed effect of the m^{th} year of birth

e_{ijklmn} (e_{jkmn}) = the random residual effect associated with the variable L_{ijklmn} (A_{jkmn}), assumed to be identically, independently and normally distributed with zero mean and constant unit variance, i.e. e_{ijklmn} (e_{jkmn}) ~ iind $(0, \sigma^2)$.

No interaction effects were included in the models since the initial analyses showed no significant interactions between the main effects. Type III test of GLM SAS procedure was used for testing the significance of the effects, to take care of the unbalanced nature of the design.

RESULTS AND DISCUSSION

Age at first lambing

Least-squares means for age at first lambing are given in Table 1. Mean age at first lambing over the period of study was 597.2 ± 12.6 days .This value is higher than 465 days reported by Molokwu and Umanna (1980) on the same breed but is lower than the values reported for most African small ruminants: 638 days for Djallonke sheep in Ghana (Tuah and Baah, 1985), 713.7 days for African long-fat-tailed sheep in Rwanda (Murayi *et al.*, 1985), 772 days for Nguni

sheep in Mozambique (Mckinnon and Rocha, 1985) and 739.5 days for Peul sheep in Senegal (Sow *et al.*, 1985).

Table 1. Least-squares means (± SE) for age at first lambing (days)

Variable	N	LSM	SE
Overall	142	597.2	12.6
Type of birth			
single	88	568.9[b]	23.1
twin	54	625.6[a]	27.3
Season of birth			
late dry	34	533.7[c]	29.2
early wet	36	641.4[a]	34.2
late wet	22	573.2[b]	38.3
early dry	50	640.6[a]	32.3
Year			
1985	43	620.3	43.7
1986	14	598.5	40.3
1987	19	511.7	39.3
1988	37	509.3	29.5
1989	21	618.3	34.3
1990	6	649.7	35.1

[abc] Means in the same column within each variable with different superscripts are significantly different (P<0.05).

Dam's type of birth and season of birth significantly (P<0.05) influenced her age at first lambing. Ewes from twin births took longer than ewes from single births (625.6 days vs 568.9 days) to come into reproductive status. This delay in coming into reproductive status by female twins may be due to their lower weights at birth and at weaning, and consequently slower growth rate and longer time to attain the body weight required for reproduction. Female twins intended for breeding may, therefore, need supplemental feeding from birth in order to ameliorate this initial handicap. The significant effect of dam's season of birth on her age at first parturition is in agreement with the reports of Sow *et al.* (1985) and Schoeman *et al.* (1991). Dams born in the late wet season and late dry season came into reproductive status earlier than those born in the other seasons. Dams born in the late dry season took advantage of the rains following immediately after, grew faster, and came into reproductive status at an earlier age. Therefore, ewes born in the late dry and late wet seasons may be preferred to others for breeding. The reason for the variations in the other seasons is not clear.

Lambing interval

Table 2. Least-squares means (± SE) for lambing interval (days)

Variable	N	LSM	SE
Overall	518	253.1	2.9
Parity			
1	119	238.3[b]	7.1
2	149	251.2[ab]	6.4
3	122	261.2[ab]	6.7
4	67	235.3[b]	8.5
5	29	236.8[b]	12.5
6	10	281.2[a]	20.9
7	22	267.9[ab]	14.4
Type of birth			
single	412	255.8	5.1
twin	106	250.4	7.3
Season of birth			
late dry	149	251.9	7.7
early wet	141	248.1	6.7
late wet	69	255.4	9.4
early dry	159	257.1	6.7
Season of previous birth			
late dry	116	245.2[b]	8.6
early wet	182	274.2[a]	7.3
late wet	108	234.7[c]	8.0
early dry	112	260.3[ab]	8.6
Year			
1988	211	225.4[c]	7.2
1989	120	253.5[b]	7.5
1990	187	280.4[a]	6.7

[abc] Means in the same column within each variable with different superscripts are significantly different (P<0.05).

Table 2 shows the least-squares means for lambing interval. The overall mean of 253.1 ± 2.9 days is shorter than 264 days reported for Djallonke sheep in Ghana (Tuah and Baah, 1985) and 279 days given for the larger Balami sheep in Nigeria (Adu *et al.*, 1985). With the twice yearly lambing programme on the Yankasa flock,

a shorter lambing interval than that observed, was expected. It seems more feasible to aim at five lambings with an average interval of 219 days in 3 years rather than twice yearly lambing. Parity, season of previous lambing and year significantly ($P<0.05$) influenced lambing interval while type of birth and season of birth had no effect ($P>0.05$). Lambing interval generally increased, though not consistently, with parity. This trend suggests that ewes should be culled from the flock after the fifth parity in order to reduce lambing intervals. The non-significant effect of type of birth observed in this study contradicts the findings of Adu *et al.* (1985) who recorded significantly longer intervals for dams giving birth to twins than singles. In the case of season of previous lambing, dams lambing previously in the wetter periods of the year had an earlier return to reproductive status than dams lambing previously in the drier periods. This could be attributed to the availability of abundant forage in the wet seasons , resulting in early return to the reproductive state. Significant season and year effects have also been demonstrated by Wilson and Durkin (1988). Year to year variations in lambing interval are associated with management and seasonal changes.

On the whole, it is recognized that this study was undertaken in an Institute where the conditions would be different from on-farm situations. Sheep farmers could benefit from the present study by adopting such breeding and management practices as recommended in order to reduce age at first lambing and lambing intervals.

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